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ABSTRACT

Phase one of a 3-year study examining the potential use of computer conferencing to enhance inservice programs for vocational educators in secondary schools had the following goals: (1) to describe the demographic characteristics of vocational teachers and administrators; (2) to determine the availability of computer resources for vocational teachers and administrators; and (3) to determine vocational teachers' and administrators' opinions of, competence in, and attitudes toward using microcomputers. Questionnaires were developed and mailed to 137 vocational administrators and 339 teachers in Ohio; responses were received from 107 (78 percent) of the administrators and 244 (72 percent) of the teachers. According to the findings, the average age of vocational teachers and administrators was 42, they had 14-21 years' average experience in public education, the teachers were about half female and half male, and the administrators were about 80 percent male and 20 percent female. The study also found that most of the administrators and teachers have microcomputers available for their use, but do not have modems. The study population agreed that microcomputers can and should be used for inservice programs. Recommendations were made to field test inservice education programs using computer conferencing. (17 references) (KC)

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EXAMINING COMPUTER CONFERENCING AS A TECHNIQUE FOR ENHANCING PERSONNEL DEVELOPMENT ACTIVITIES: FINAL REPORT FOR YEAR ONE OF A THREE YEAR INTERDISCIPLINARY STUDY

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Vocational teachers are facing rapid changes in both the knowledge base and technology available to them as they prepare young people and adults for employment in the twenty-first century. Cetron and Davies (1989) suggested that the present level of technical knowledge available will represent only one percent of the knowledge that will be available in 2050. Additionally, technological advances such as computers, lasers, and robots will open many new avenues for enhancing teaching. Naisbitt and Aburdene (1990) state that this type of technology will empower individuals by making information readily available to them.

The types of changes described above will have a dramatic impact on the way in-service education is delivered. Congress has also addressed legislation to provide financial resources for improving the educational technology and staff development in our schools (Knauth, 1989; West, 1989). One way of supplementing and enhancing in-service programs is through the use of computer conferencing--involving the use of both computers and telecommunications. Norton and Stammen (1990) stated:

> Computer conferencing allows students to enjoy an interactive classroom environment without having to leave home or work. Face-to-face classroom discussions are recreated on computer terminals. Communication devices called modems allow the course instructor and student to talk to each other electronically over telephone lines. The lecture portions of a course are replaced by individualized competency-based packets of materials students read and study at their own pace. Throughout the course, the instructor initiates and facilitates discussions by computer with one student or with a group of students, depending on what they are studying. At the end, students are given either a written or real world performance test. (p.26)

Additionally, they describe computer conferencing as an innovative form of in-service training that addresses many problems vocational teachers and administrators face when courses are taken to stay informed about their fields. Barriers such as demands of work and family or long commutes to class that inhibit vocational teachers' and administrators' ability to stay abreast in their area can be overcome through the use of computer conferencing.

Roberts (1987), examined distance education to determine the interactive capabilities of the computer, namely electronic mail and conferencing. Roberts concluded that computer conferencing can extend many of the learning

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opportunities of the classroom to distance and independent study. Additionally, it was felt that course delivery exclusively by computer is not only feasible, but an exciting alternative pedagogy. Advantages reported by Roberts were that teaching by conferencing overcomes the most serious disadvantage of independent and distance learning: It breaks down the isolation of the student from peers. It also permits the student to benefit from the shared experience of a group engaged in the same study and the opportunity to measure his or her ideas against those of other students in the class. Conferencing also maintains a complete record of all that is said and can be reviewed at any time.

In addition, conferencing is asynchronous, so time and distance deprive no student of access to learning. He also indicated that an electronic seminar differs from a classroom seminar. Everything that is said can be preserved for as long as the conferees wish and reviewed by anyone in the conference at any time. No worthy idea is lost because the instructor failed to pick up on it at the time it was expressed. Equally, misstatements are not forgotten. Also, unless the instructor technically restricts student input, every participant has an equal opportunity to be heard and to be ignored. Classes cannot be dominated by more aggressive students and those who talk, just to talk, tend to feel pressure to be more thoughtful. It was also indicated that the electronic seminar generates more interaction among members of the class and a greater proportion of student participation compared to that of the instructor.

In another study, Miller (1990) examined the degree to which computer conferencing techniques can be used to enhance personnel development activities. He concluded that computer conferencing is most appropriate for 1) providing total instruction through technology; 2) supplementing or enriching traditional delivery systems; 3) providing or improving access to new clients or audiences; and 4) reaching distance learners. Furthermore, he described students' reactions as positive regarding the use of computer conferencing as a vehicle for instruction. The most frequently mentioned advantage was the ability to participate in an instructional activity based upon a person's unique work schedule. Also students indicated they greatly appreciated the saving of travel time normally required to participate in campus-based courses.

Adapting technology such as computer conferencing to meet the needs of educators will not be an easy task. In an evaluation of computer conferencing, Abate (1989) reported that:

> Although the students felt generally that computer conferencing enhanced communication during the course, a number felt strongly that computer conferencing should not replace classroom sessions. They expressed a need to have face to face communication with the instructor and fellow students. Within this group a few felt that computer conferencing tended to inhibit rather than promote communication, because the reactions of those addressed by a message stored on the computer could not be judged by the sender immediately, as would be the case with a regular conversation during a discussion in class. (p.14)

Thus, if it is to be successfully utilized, computer conferencing will require resources, commitment, and creativity. It also will require staff development and training to effectively utilize the technology. Many questions regarding the effectiveness, methodology and design of such projects remain unanswered (U.S.

Office of Technology Assessment, 1989). Additionally, teacher educators will need valid and reliable information regarding the availability of computer technology, as well as the comprehension, utilization, and attitudes of vocational teachers and administrators toward microcomputers.

Yeun (1984), examined the understanding and attitudes of 273 Pennsylvania vocational teachers. He reported that attitudes towards using microcomputers were positively correlated with educational level, microcomputer experience, microcomputer training, utilization of microcomputers, and the availability of microcomputers. Teachers' attitudes towards the use of microcomputers showed negative relationships with age and service area.

In a survey of ten percent of Arkansas' K-12 school principals, Carl and Hoelscher (1984) examined opinions held by principals toward guiding the adoption or rejection of the use of computers within their scope of control. It was concluded that principals seem to have developed a strong commitment to the belief that computers will have a positive effect on education.

Raven and Welton (1989) assessed microcomputer utilization in 87 Kansas vocational agriculture programs to identify current uses of microcomputers. They concluded that there was a moderate positive correlation between respondent's years of teaching experience and the number of computers in the agriculture department. They also found that the lack of time by instructors to learn more about computers was the primary factor inhibiting the use of microcomputers. Additionally, they reported that the lack of funding for hardware and software was an inhibitor.

Redick, Loyd and Chatraphorn (1989) examined factors that promoted or inhibited the voluntary participation of vocational educators in professional development activities. They reported that the two personnel development activities ranking highest by amount of time spent and the degree of benefit were: (1) personal activities that lead to professional growth, and (2) college and university in-service activities. Computer conferencing offers the potential for combining these two activities.

Vocational educators in the State of Ohio have been involved in a limited use of computer conferencing. However, information on its availability, utility, and effectiveness as a medium for enhancing and supplementing in-service and personnel development efforts is lacking.

Purpose and Objectives

This study was designed to examine the potential use of computer conferencing to enhance and supplement in-service programs offered for vocational educators in secondary schools (i.e., comprehensive and joint vocational) by the Central Region Vocational Education Personnel Development Center. The broad objectives of the study were to:

1. Determine the availability of resources for conducting personnel development activities by computer conferencing in the Central Region of Ohio.

2. Identify and develop technical and pedagogical topics that could be addressed with computer conferencing techniques.

3. Determine the effectiveness and efficiency of computer conferencing in enhancing and supplementing personnel development activities.

This research and development project was planned for a three-year period consisting of three phases, each phase coinciding with a project year: Phase I-- Contextual Analysis; Phase II-- Development and Pilot Testing and Phase III-- Evaluation and Reporting.

This paper summarizes Phase I, Contextual Analysis, and coincides with the first broad objective. The specific objectives were as follows:

a. To describe the demographic characteristics of vocational teachers and administrators.
b. To determine the availability of computer resources for vocational teachers and administrators.
c. To determine vocational teachers' and administrators' opinions of and competence in using microcomputers.
d. To identify factors underlying vocational teachers' and administrators' attitude toward using computers.

Methodology

Design

This study utilized descriptive survey research (Ary, Jacobs, and Razavieh, 1990). Mailed survey questionnaires were used to determine the availability of microcomputer resources and the perceptions of vocational teachers' and administrators' concerning their microcomputer competence and attitudes toward microcomputers

Populations and Samples

The populations for this study were all secondary vocational teachers (N = 1,341) and administrators including Superintendents, Supervisors, Vocational Directors and Principals (N = 176) located in the 13 Vocational Education Planning Districts in the Central Region of Ohio who were responsible for the vocational programs in their school system during the 1990-91 academic year. The frame was obtained from the Office of Management Information Systems, the Division of Vocational and Career Education, Ohio Department of Education. Randomly drawn samples were taken from both vocational teachers (n = 339) and administrators (n = 137) based on Krejcie and Morgan (1970), reflecting a 5% margin of error.

Instrumentation

A questionnaire developed by Yeun (1984) guided the development of the two instruments used to collect the information from vocational teachers and administrators. The instruments consisted of three sections. Section I was designed to determine the level of perceived microcomputer competence using a five point Likert-type scale ranging from 1=Very Competent to 4=Not at all Competent and 5=Do not know. Section II was designed to assess opinions about using microcomputers for in-service education using a five point Likert-type scale ranging from 1=Strongly Agree (SA) to 5=Strongly Disagree (SD). Section III gathered demographic and situational information. A panel of eight graduate

students and four faculty members at The Ohio State University assisted in refining items and establishing content and face validity.

The instruments were then pilot tested with a purposefully selected sample of 30 vocational teachers and 30 administrators located outside the Central Region of Ohio in order to establish the reliability of the instrument. Reliability coefficient were obtained for Section I and II of both instruments. The vocational teachers' instrument had a Cronbach's alpha of .93 on Section I and .87 on Section II. The reliability coefficient (Cronbach's alpha) obtained for the administrators' instrument was .95 on Section I and .92 on Section II. The final draft of the instruments contained 18 items in Section I, 37 items in Section II and 10 items for the vocational teachers' questionnaire and 15 items for the administrator's questionnaire in Section III.

Data Collection

Each individual received a packet including a cover letter, questionnaire and a self-addressed, stamped return envelope. Individuals who had not returned the questionnaires by the end of the second week following the initial mailing received a mail follow-up including a reminder letter, a copy of the cover letter, a questionnaire and a self-stamped return envelope to obtained the questionnaires. A second follow-up request (included was a second reminder letter and copy of the cover letter, questionnaire, a self-addressed, stamped return envelope) was mailed to the non-respondents at the end of the forth week. At the end of the sixth week, 72.0% (244) usable responses were obtained from vocational teachers and 78.1% (107) usable responses were obtained from administrators. Non-response error was controlled by comparing early with late respondents on selected varibles with late respondents serving as surrogates for non-respondents as suggested by Miller and Smith (1983). No significant differences were found between the two groups of respondents. Therefore, the results were generalized to the population.

Analysis of Data

The data were analyzed using the SPSS/PC+ statistical program. Descriptive statistics were used to describe the data relative to demographic characteristics, competence in using computers, and attitudes towards using computers. Exploratory factor analysis was used to identify factors underlying attitudes towards using microcomputers. Norusis (1988) suggested that factor analysis is used to identify a relatively small number of factors that can be used to represent relationships among sets of many interrelated variables. Eigenvalues and Scree plots were used to identify breaks or discontinuity in determining the factors. This was followed by a verimax rotation of the factors. An alpha level of .05 was set *a priori*.

Results

The first objective was to determine the demographic characteristics of the vocational teachers and administrators. The average age of vocational teachers and administrators in the Central Region (Table 1) was 41.7 (*SD*=8.7) and 45.2 (*SD*=7.4) respectively. The average number of years worked in public education was 14.2 years (*SD*=8.6) for vocational teachers and 21.3 years (*SD*=6.9) for administrators. The gender of the vocational teachers and administrators is presented in table 2. Gender was equally split for vocational teachers, where

50% (122) were female and 50% (122) were male. Analysis of gender of administrators found 20.6% (22) were female and 79.4% (85) were male.

Table 1.
Respondents' Characteristics

Characteristics	Teachers Mean	Teachers SD	Administrators Mean	Administrators SD
Age	41.7	8.7	45.2	7.4
Years Worked in Public Education	14.2	8.6	21.3	6.9

Table 2.

Respondents' Gender

Gender	Teachers Frequency	Teachers Percent	Administrators Frequency	Administrators Percent
Female	122	50.0	22	20.6
Male	122	50.0	85	79.4
Total	244	100.0	107	100.0

The highest educational level (Table 3) reported by vocational teachers indicated that 7% (17) had a high school degree, 4.1% (10) had an associate degree, 48.3% (117) had a bachelor's degree, 40.1% (97) had a master's degree and 0.5% (1) had a doctorate. Administrators reported the following: 2.8% (3) had a bachelor's degree, 89.7% (96) had a master's degree and 7.5% (8) had a doctorate's degree.

Table 3.

Highest Educational Degree of the Respondents

Educational Level	Teachers Frequency	Teachers Percent	Administrators Frequency	Administrators Percent
High School	17	7.0	0	0.0
Associate	10	4.1	0	0.0
Bachelor	117	48.3	3	2.8
Master	97	40.1	96	89.7
Doctorate	1	0.5	8	7.5
Missing	2		0	
Total	244	100.0	107	100.0

The areas in which vocational teachers taught (Table 4) were as follows: 8.2% (20) in agriculture, 11.9% (29) in business, 7% (17) in marketing, 1.6% (4) in health, 23% (56) in home economics, 22.5% (55) in trade and industrial, 9.4% (23) in occupational work experience, 8.2% (20) in occupational work adjustment, 0.4% (1) in diversified occupations and 7.8% (19) indicated they taught in other areas.

Table 4.

Teaching Area of Vocational Teachers

Teaching Area	Frequency	Percent
Agriculture	20	8.2
Business	29	11.9
Marketing	17	7.0
Health	4	1.6
Home Economics	56	23.0
Trade & Industrial	55	22.5
Occupational Work Experience	23	9.4
Occupational Work Adjustment	20	8.2
Diversified Occupations	1	0.4
Other	19	7.8
Total	244	100.0

Positions held by administrators (Table 5) are reflected by the following: 18.7% (20) were vocational directors, 19.7% (21) were supervisors, 54.1% (58) were principals, 3.7% (4) were superintendents and 4.7% (5) reported to have other positions.

Table 5.

Administrative Positions of Administrators

Position	Frequency	Percent
Vocational Director	20	18.7
Supervisor	21	19.7
Principal	58	54.1
Assistant Supt.	0	0.0
Superintendent	4	3.7
Other	5	4.7
Total	108*	100.0

*respondents were able to report holding more than one position.

In addressing the second objective of the study, availability of microcomputer resources (Table 6), it was found that 48.1% (116) of the vocational teachers and 55.1% (59) of the administrators owned a computer. When responding to the questions about modems, 11.5% (28) of the vocational teachers and 13.1% (14) administrators reported to have access to a modem at home. In addition, 15.6% (38) of the vocational teachers and 43.9% (47) of the administrators indicated that they access to a modem at their school.

Analysis of school microcomputer resources found that 52.2% (111) of the vocational teachers reported that their school provided them with their own computers, 44.8 (99) reported having to share a computer with other teachers or students, and 5.0% (11) indicated that their school does not provide them with a computer. Sixty-one point four percent (62) of the administrators reported that their school provided them with their own computer, while 30.7% (31) reported to share a computer with other administrators, and 7.9% (8) reported that their school does not provide them with a computer.

Table 6.

Availability of Microcomputer Resources

Computer Resources	Teachers		Administrators	
	Frequency	Percent	Frequency	Percent
Own a microcomputer	116	48.1	59	55.1
Have a modem at home	28	11.5	14	13.1
Have a modem at school	38	15.6	47	43.9
Schools provide individuals with a computer	111	50.2	62	61.4
Schools provide a shared computer	99	44.8	31	30.7
Schools do not provide a computer	11	5.0	8	7.9
Missing	23		6	
Total	244	100.0	107	100.0

The type of computer training vocational teacher reported to have received (Table 7) were as follows: 34.3% (68) reported to have been self-taught, 23.7% (47) indicated they received individual instruction on a one to one basis, and 32.8%

(65) reported to have attended workshops, seminars or courses in computer training. Other forms of training were reported by vocational teachers, 3.0% (6), where as, 6.1% (12) reported to have had no instruction in computers. Administrators indicated the following: 40.0% (38) reported to have been self-taught, 16.8% (16) had received individual instruction, 30.5% (29) had received instruction from workshops, seminars, or courses and 3.2% (3) indicated they had other forms of training, where as, 9.5% (9) indicated they had received no instruction in computers.

Table 7.

Type of Computer Training Received

Type of Computer Training	Teachers		Administrators	
	Frequency	Percent	Frequency	Percent
Self-taught	68	34.3	38	40.0
Individual instruction	47	23.7	16	16.8
Workshop, Seminar or Courses	65	32.8	29	30.5
Other	6	3.0	3	3.2
No instruction	12	6.1	9	9.5
Missing	46		12	
Total	244	100.0	107	100.0

Five items were selected from the questionnaire to represent vocational teachers' and administrators' interest in using microcomputers for in-service education. Respondents reacted to the statements using a numerical scale ranging from 1=strongly agree (SA) to 5=strongly disagree (SD). The mean score and standard deviation are reported for each item (Table 8). The items, mean and standard deviation were as follows: (1) the use of microcomputers can improve the quality of in-service programs -- 2.04 (SD=.82) for vocational teachers and -- 2.00 (SD=.78) for administrators; (2) schools should have microcomputers available for in-service education -- 1.97 (SD=.74) for vocational teachers and -- 1.84 (SD=60) for administrators; (3) the use of microcomputers for in-service education should be encouraged -- 1.95 (SD=.74) for vocational teachers and -- 1.91 (SD=.64) for administrators; (4) using microcomputers would add interest to in-service programs -- 2.15 (SD=.78) for vocational teachers and -- 2.14 (SD=.61) for administrators; (5) the use of microcomputers for in-service education should occur in your vocational area -- 1.98 (SD=.72) for vocational teachers and -- 1.87 (SD=.62) for administrators; and (6) microcomputers provide a supplemental instructional approach to in-service education -- 2.07 (SD=.70) for vocational teachers and -- 2.00 (SD=.48) for administrators. The respondents agreed with

the items, indicating an interest in using microcomputers for in-service education.

Table 8.

Teachers' and Administrators' Interest in Microcomputers for In-service Education

Item	Teachers Mean	Teachers SD	Administrators Mean	Administrators SD
The use of microcomputers can improve the quality of in-service programs.	2.04	.82	2.00	.78
Schools should have microcomputers available for in-service education.	1.97	.74	1.84	.60
Use of microcomputers for in-service education should be encouraged.	1.95	.74	1.91	.64
Using microcomputers would add interest to in-service programs.	2.15	.78	2.14	.61
The use of microcomputers for in-service education should occur in your vocational area.	1.98	.72	1.87	.62
Microcomputers provide a supplemental instructional approach to in-service education.	2.07	.70	2.00	.48

Additionally, administrators' willingness to support vocational teachers for microcomputer in-service is reported in table 9. It was found that 69.2% (74) administrators are willing provide release time for their vocational teachers to attend a microcomputer in-service. While 18.7% (20) of the administrators reported their willingness to support long distance telephone calls associated with microcomputers. Twenty-two point four percent (24) administrators reported their support of microcomputer communication hook-up costs. When questioned about the acquisition of microcomputer hardware and software, 31.8% (34) and 37.4% (40) of the administrators supported these cost respectively. Further, 19.6% (21) indicated their willingness to provide their vocational teachers with a telephone line for microcomputer communication, while only 8.4% (9) indicated that they would not support any of the mentioned costs.

Table 9.

Administrators' Willingness to Support Vocational Teachers for a Microcomputer In-service

Expenses	Frequency	Percent
Release time	74	69.2
Long distance telephone calls associated with microcomputers	20	18.7
Microcomputer communication hook-up cost	24	22.4
Acquisition of required microcomputer hardware	34	31.8
Acquisition of required microcomputer software	40	37.4
Acquisition of a telephone line for microcomputer communications	21	19.6
None of the expenses listed	9	8.4

In addressing the third objective it was found that, on a scale of computer competence ranging from 1-not at all competent to 4-very competent, vocational teachers ranged from 2.04 to 3.74. Administrators' competence ranged from 2.21 to 3.96 (Figure 1). Thus, vocational teachers and administrator perceived themselves to be somewhat competent in the use of microcomputers.

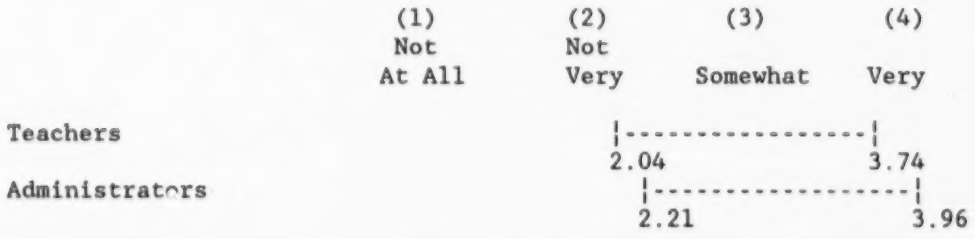

Figure 1. Range in Perceived Computer Competence

In addressing the fourth objective of the study, an examination of the Eigenvalues and their Scree plots resulted in the selection of four factors accounting for 56.5% of the variance in the attitude vocational teachers have towards using microcomputers (Table 10). The four factors and the percent of variance accounted for include: (1) educational applications of microcomputers--39.8%, (2) personal apprehensions toward using microcomputers--7.0%, personal motivation for using microcomputers--4.9%, and (4) professional/work context--4.8%.

Table 10.

Factors Influencing Teachers' Attitude Toward Using Microcomputers

Factors	Proportion of Variance Explained	Cumulative Percent
1. Educational application of microcomputers	39.8	39.8
2. Personal apprehensions towards using microcomputers	7.0	46.8
3. Personal motivation for using microcomputers	4.9	51.7
4. Professional/work context	4.8	56.5

Two examples are given for each of the four factors and are presented below. For the **educational application of microcomputers** factor, the items and their factor loading include:

The use of microcomputers can improve the quality of in-service programs. (.72)

The use of microcomputers would improve my instructional effectiveness. (.56)

The **personal apprehensions towards using microcomputers** factor consisted of the following two items and their factor loadings:

The thought of using microcomputers to communicate/network with people I can't see frightens me. (-.66)

Microcomputers are too mechanical for me to use. (-.51)

The **personal motivation for using microcomputers** factor include the following two items and their factor loadings:

I have a personal interest in learning about microcomputers. (.69)

I have an interest to learn about microcomputers to enhance student learning. (.60)

The final factor, **professional/work context** include the following two items and their factor loading:

I considers myself informed about the use of microcomputers in my field. (.75)

I am knowledgeable about commercially produced microcomputer programs available for my subject matter area. (.73)

Four factors were determined to account for 51.8% of the variance in the attitude administrators have toward using microcomputers (Table 11). The four factors and the percent of variance accounted for include: (1) administrative applications of microcomputers--32.5%, (2) instructional benefits of microcomputers for in-service education--7.8%, (3) personal apprehensions toward using microcomputers--6.4%, and (4) personal motivation for using microcomputers--5.0%.

Table 11.

Factors Influencing Administrator's Attitude Toward Using Microcomputers

Factors	Proportion of Variance Explained	Cumulative Percent
1. Administrative applications of microcomputers	32.5	32.5
2. Instructional benefits of microcomputers for in-service education	7.8	40.3
3. Personal apprehensions towards using microcomputers	6.4	46.7
4. Personal motivation for using microcomputers	5.0	51.8

Two examples are given for each of the four factors and are presented below. For the **administrative applications of microcomputers** factor, the items and their factor loading include:

> Microcomputers are a flexible medium for administrative work. (.56)
>
> The use of microcomputers would improve my administrative effectiveness. (.56)

The **instructional benefits of microcomputer for in-service education** factor consisted of the following two items and their factor loading:

> The use of microcomputers can improve the quality of in-service programs. (.72)
>
> Schools should have microcomputers available for in-service education. (.69)

The **personal apprehensions toward using microcomputers** factor contained the following two items and their factor loading:

> The thought of using microcomputers to communicate\network with people I can't see frightens me. (-.66)
>
> Microcomputers are too complicated for me to use. (-.51)

The final factor **personal motivations for using microcomputers** contained the following two items and their factor loading:

> I would be interested in trying alternative instructional methods for in-service education. (.64)
>
> I would be willing to use microcomputers to send electronic mail messages. (.51)

CONCLUSIONS

Based on the finding of the study, the following conclusions have been formulated:

1. Vocational teachers and administrators are "somewhat" knowledgeable about computers.

2. Vocational administrators are somewhat willing to provide teachers with release time for microcomputer in-service programs.

3. Vocational teachers agree that microcomputers can and should be used for in-service programs.

4. Vocational teachers and administrators have computers available for their use.

5. Vocational teachers and administrators do not have ready access to modems.

6. Vocational teachers' attitude toward using microcomputers are influenced by the following factors: perceptions of educational applications, personal apprehensions, personal motivations, and professional/work context for using microcomputers.

7. Vocational administrators' attitude toward using microcomputers are influenced by the following factors: perceptions of administrative applications, instructional benefits, personal apprehensions, and personal motivations for using microcomputers.

RECOMMENDATIONS

Based on the findings and conclusions drawn from this study, the following recommendations are suggested:

1. Teacher educators should develop and field test curriculum using computer conferencing for in-service education programs offered to vocational teachers and administrators located in Ohio's Vocational Education Personnel Development Center for the Central Region.

2. Modems should be made accessible to teachers and administrators involved in the field test of computer conferencing for in-service education.

3. The computer conferencing curriculum should: include information at an intermediate level, emphasize the educational applications and instructional benefits of microcomputers, reduce microcomputer anxiety, and reinforce existing levels of knowledge and competence.

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